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JOHN DEERE JOURNAL

for JOHN DEERE EMPLOYEES and RETIREES WORLDWIDE

Global Teamwork *for* Global Markets

Creating the 5430i Self-Propelled Sprayer

WHAT'S INSIDE

- *Mike Mack on Growing a Great Business*
- *Reducing Greenhouse Gases*
- *CI Process Expands*
- *The New High-Speed Dozer*

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In this Issue

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4
Global Teamwork
Demonstrating just how global John Deere has become, teams at Horst, Mannheim, and Des Moines developed a new sprayer for Europe on a fast-track schedule

7
Growing a Great Business
CFO Mike Mack says the company is in a position to grow, but there's a lot of work to do

10
A Really New Machine
Deere's new high-speed dozer is just what customers asked for

12
CI Continues to Improve
With a new tool and proven results, the Continuous Improvement Process is spreading throughout the company

14
John Deere Sets Greenhouse Gas Reduction Goal
A stretch goal for reducing emissions of heat-trapping gases that accelerate climate change will focus on reducing energy use

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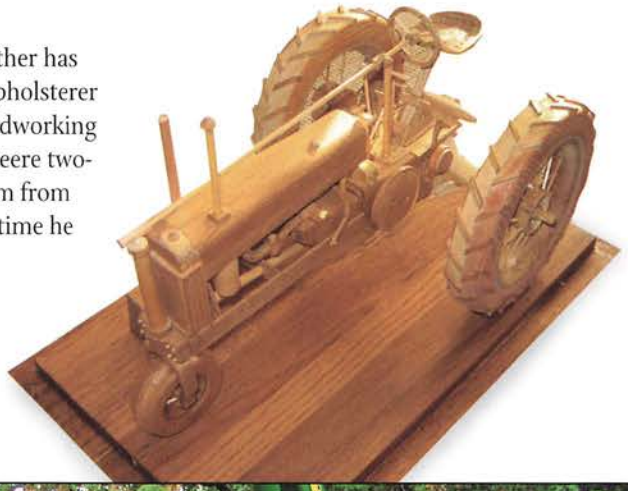
FeedBack

To the editor:

I have been a C&CE dealer for 23 years. My father has always been a tractor enthusiast. He was an upholsterer for 40 years. Since his retirement he does woodworking as a hobby. The photo shows the third John Deere two-cylinder tractor that he has built. He does them from wood by looking at pictures and models. The time he has in them is unreal and they are beautiful.

John Drum
President, Genesee Equipment Co., Inc.
Dansville, New York



To the editor:

I thought you folks would get a kick out of this rather funny picture of my John Deere 4110 Tractor (which I absolutely LOVE) that took on a "bearded" appearance when it was used to mow a dandelion-filled horse pasture.

The bearded operator is Dean Anderson, with his favorite barn cat, "Barney."

Cynthia Day O'Brien
Rochester, Minnesota

Global teamwork meets

MARKET OPPORTUNITY

The rollout last fall of the John Deere 5430i Self-Propelled Sprayer shows just how global the company has become.

There was a time when it might have been hard to imagine U.S. engineers designing a product for European customers — a product that would be built in European factories using U.S. manufacturing expertise.

It's a process that some believe would have been too unconventional to work.

Today, though, thanks to the global culture that has been fostered at John Deere, "We're in a new era," said Steve Junge, Senior Project Engineer at John Deere Des Moines Works, where self-propelled sprayers are designed for agricultural equipment markets.

The team at Horst: *from left, top row, Henny Joosten, Frank Clabbers, Rick Verbruggen, Willy Peeters, and Sacha Verheijen; bottom row: Jaap Wilting, Harold Smetsers, Christian Eichholtz, Menno Schuhmacher, Andy Bentlage, Richard Houben, and Henk Peters.*

The Des Moines team *included, from left, front row: Micah Berberich, Jeff Ringwald, Mark Sahlin, Mike Kersey, Dan Huegerich, Vern Gambleton, Rick Killion; 2nd row: Justin Hurt, Eric Odegaard, Brad Hitchler, John Fiedler, John Ringer, Brian Runde, Jason McIlravy, Randy Renze; 3rd row: Kent Klemme, Ken Hunt, Adam Royal, Tom Johnson, Wade Twedt, Travis Auderer; Back row: Pat Fisher, Bill Norton, Gaurav Suri, Dave Williams, Nathan Schmidt, Brenden Stephens.*

"We no longer think only about designing and manufacturing sprayers in Des Moines, Iowa, for the U.S. market," Junge said. "We're thinking about designing and selling sprayers all over the world — meeting customer requirements in France, Germany, and Brazil — just as we do in Iowa and Illinois."

For the past two years, a team from Des Moines Works has been working with teams from John Deere Fabriek Horst in The Netherlands and John Deere's Mannheim Works in Germany to develop the 5430i, John Deere's first self-propelled sprayer for the European market.

The making of the 5430i, or the "Matterhorn" as it was dubbed internally, has become a case study in global, aligned, high-performance teamwork.

Building self-propelled sprayers for Europe is complex because it means designing machines with enough options to meet the different requirements of many countries. In the United States, for example, Deere builds sprayers with four different spraying widths and three tire sizes, while Europe requires eight widths and nine tire sizes.

In early 2006, representatives from Des Moines and Horst met to discuss how they could develop and manufacture the machine. Des Moines Works was given responsibility for the design and testing of the new sprayer because of the plant's experience in the growing U.S. sprayer market. Horst was designated the manufacturer because it was already building trailed sprayers for Europe.

Because of the size and complexity of the project, John Deere's Mannheim Works became the third core team member, charged with supporting quality, supply management, logistics, and manufacturing engineering.

To figure out how to share data and integrate processes the teams followed the Enterprise Product Delivery Process or EPDP, a John Deere system for creating or updating products used extensively on tractor, combine, and forage harvesting lines. As European team members offered input on what customers wanted and needed in the finished product, engineers from Des Moines Works incorporated that information into the sprayer's design.

"The 5430i was the most complex machine we had ever designed in terms of options, technology, and customer requirements," said Junge, who served as U.S. program manager on the project. "It challenged our ability to be flexible."

A huge design challenge was fitting all the necessary features in less machine space on narrow models, Junge said. A goal was to keep the U.S. and European sprayers as similar as possible, using parts from European trailed sprayers, U.S. self-propelled sprayers, and tractors wherever they could.

Along the way, the Des Moines and Mannheim teams kept in close touch with the Horst factory team, making sure the assembly and manufacturing process could execute all design elements.

For the past six months, Mannheim staff has traveled to Horst every week to prepare for the assembly and manufacturing of the sprayer. Twelve limited-production sprayers were built initially, with full pro duction scheduled to begin in Summer 2008.

Other partners in the project were John Deere Usine de Saran in France as the engine supplier and John Deere's Bruchsal Works in Germany as the cab supplier. The John Deere Technology Center in India assisted with sprayer design and service publications.

The teams settled into regular weekly communication on the project to discuss strategies, plans, and timelines. The process started with phone calls and eventually expanded to net and live meetings and regular management reviews to discuss progress.

Effective communication and open minds are critical to the success of a project like the 5430i, said Christian Eichholtz, project manager in Europe. "No one could come to the project and expect to do it the German way, the American way, or the Dutch way. *(continued on page 6)*

"The 5430i was the most complex machine we had ever designed in terms of options, technology, and customer requirements. It challenged our ability to be flexible."

*— **Steve Junge**, Senior Project Engineer at John Deere Des Moines Works*

It had to be the best of all ways, with an acceptance of other cultures."

"I'm extremely pleased with how well our design engineers listened to our customers, dealers, and marketing people," Junge said. "They took the approach that this is different than what we've done before, we understand why, and we're going to work to meet the needs of our customer."

Likewise, the team from Horst has been very willing to listen to the Des Moines team's experience in manufacturing self-propelled sprayers, Junge said. "Their manufacturing people have been on the Des Moines sprayer assembly lines, asking how we put our machines together."

Perhaps the biggest challenge has been keeping to the two-year timeline to get the 5430i to market while also meeting requirements for profitability, reliability, and quality, Junge said.

"Normally we would be on a three-year schedule for a project like this, but since we're not in the self-propelled sprayer market in Europe, there is a lot of opportunity," he said. So the teams had to move quickly.

In developing the 5430i Sprayer, a team process has been refined that can be used over and over to grow Deere's self-propelled sprayer business worldwide, Junge said.

"The project has definitely shown us that we can work internationally as a team and overcome whatever hurdles there are in the process," Junge said.

The Mannheim team: *from left, Peter Pelczer, Olaf Lorenz, Wolfgang Schwitzke, Christian Foerster, and Rainer Ascherl.*

Growing a great business

A growth culture includes exceptional performance — Mike Mack

Mike Mack, Senior Vice President and CFO, Deere & Company

To find out how well John Deere is doing in growing a business as great as its products, *John Deere Journal* asked Mike Mack, Senior Vice President and Chief Financial Officer, to answer some questions.

We've been concentrating on growing a great business for two years now. How are we doing?
We're beginning to see the benefits of the focus and the discipline we've built into the Business Growth Process. More growth ideas are being generated and captured, and they are increasingly customer focused. But we've got a long way to go to sustainably meet our SVA growth goals.

Haven't we already been growing SVA pretty dramatically over that period?
We've certainly created some SVA from growth, but mostly we've been learning how to get it from current operations and from the expansion of current operations. We've done a good job of getting into position to grow a great business. But to get the kind of SVA growth we're targeting, we need other approaches as well.

Industry growth and operating improvements are very important, but they won't by themselves get us to our growth targets. So, we have to become more aggressive seeking growth sources beyond core operations.

What is the target?
Our goal has always been to increase SVA by 7 percent a year. That's an aggressive goal. To accomplish it, we have to generate significant growth of the company, and we have to do it faster than before.

How are we doing that?
Our growth strategy is pretty straightforward: We grow through innovation, invention, and accelerated customer focus. The Business Growth Process and its elements, especially 30/70 Innovative Growth and the Accelerated Innovation Process, are designed to provide a systematic way to focus on growth, generate growth ideas, rigorously analyze them, and find ways to control the risk as much as possible.

Why the focus on innovative growth?
Deere has a strong record of profitable growth from taking the John Deere brand to a growing, global group of customers, and that has to continue. To reach our goals, we must add ideas that go beyond traditional businesses and markets, and we have to accelerate the decision-making process. The reason is that only growth with a strong return on invested capital creates sustainable value, and growth based on innovation typically has a significantly higher ROIC than does growth based on line extensions. But, we need both kinds of growth, because all growth, to be sustainable, has to contribute to the company's core.

What do you mean by contributing to the company's core?
The new growth has to ultimately become part of our core businesses. It's the result of a "virtuous circle" of disciplined growth: While we're strengthening and growing the core businesses, we're also mapping related adjacent business opportunities, those that are in large measure related to businesses we are already in. Those adjacencies are prioritized based on their potential and also on their "fit" with the core businesses. In other words, how well the skills and competencies we use in our core businesses match up with those needed in the new areas we're considering.

Is there ever a perfect fit?
Seldom. If there were, we would probably already be in that business. But the gaps should be as small as possible, and we might even use partnerships and acquisitions, such as the recent acquisitions in water technologies, to fill them. When it all works out, and we're successful
(continued on page 8)

"Sustained growth is possible only when you delight customers."

*— **Mike Mack**, Senior Vice President and CFO, Deere & Company*

in the new area, we can redefine the core business to include the expansion — and begin looking at opportunities adjacent to the new, expanded core.

How much do we have to grow to meet that 7-percent SVA growth goal?
Our target is $1.5 billion SVA by 2014. Remember, we always talk about these goals in terms of normal volumes. At that level of SVA, we estimate we would be operating at a level of revenues approaching $40 billion. Getting to that level of revenues, incidentally, would be a pretty good indication that you're serving customers very well. That's where operating performance and disciplined growth come together, and that will be the evidence that we've transitioned from a performance culture to a growth culture.

So we concentrate mostly on growth?
A growth culture includes exceptional performance. We started with a focus on exceptional performance because we had to get that right in order to get into a position to grow. For example, we have transformed Deere from being a relative underperformer in terms of ROIC to a top decile performer compared with our peers and with the top 500 industrial companies in the United States.

So, that's where we've gotten our SVA thus far?
It's exceptional performance that leads to SVA, whether through growth or current operations. The important thing about SVA is that it provides higher cash flows more consistently. That funds our growth — and other things, like pensions and dividends and share buybacks. Importantly, our pension and OPEB (other post-employment benefits) obligation funding is in very good shape. Also, we have had six dividend increases since 2004, for a cumulative increase of 155 percent. Additionally, we have repurchased about $5 billion worth

Stephan Formica reviewed 900 potential business deals at a venture capital firm, looking for opportunities for John Deere.

John Deere explores

In its drive for innovative growth, Deere is opening new channels, getting ideas from academia and suppliers, and amassing advanced marketing research and business intelligence.

For the past year, it has also been prospecting in the constant stream of business models, technology applications, and ideas that people take to venture capital funds.

John Deere Ag Division Business Development has been wading in that stream through a €5 million investment in Emerald Technology Ventures Fund II, a venture capital fund managed by Emerald Technology Ventures, LLP, headquartered in Zurich. Deere is one of 29 limited partners in the fund.

"In the beginning, it took awhile to figure out what people at Deere are working on. It took awhile to understand what our innovation needs are, and which are our major R&D areas that could be supported by new ideas coming through venture capitalists," said Stephan Formica, who was seconded to Emerald, meaning he worked for the venture capital firm while remaining a Deere employee.

The venture capital world moves very fast. Formica has screened 900 potential business deals, about 400 of which he has passed to various Deere divisions or the Moline Technology Innovation Center for more in-depth analysis. "Most of the time," he said, "I was looking at technology and companies that have to do with our core businesses and our expansion into water and renewable energy."

Emerald focuses on technologies in energy, materials, and water. It has offices in

of stock since 2004, reducing our share count outstanding by about 14 percent.

How does that exceptional performance become a growth culture?
When you look at what employees around the company are most engaged in, you realize everyone is making the move from a performance culture to a growth culture.

Take DPS and DPQS. On the surface, those might appear to some people to be initiatives aimed at exceptional performance, and they do improve performance. But they are growth initiatives, too.

Sustained growth is possible only when you delight customers. That means you have to be committed to continuous improvements in the quality, reliability, and delivery of products and services.

Both DPS and DPQS are explicitly customer-focused. So is our process for delivering new products and services that can help customers succeed in their own businesses and expanding into new customer segments, new channels, and new geographies.

A great business gets great results that are sustainable and reproducible. There are three things we have to do to be a great business: Lower our earnings volatility; achieve sustainable SVA growth; and generate top-line, or revenue, growth.

If, by 2014, we can prove we've lowered volatility in our earnings and sustained SVA growth AND top-line growth, we might have some claim to being a great business.

venture capital

Zurich, Switzerland, and Montreal, Canada. It manages three venture capital funds and two portfolio mandates totaling more than $440 million.

The main tasks during the first year of participation have been to make business development groups at Deere aware of the venture capital work and to learn how to take advantage of the volume of information it produces.

Exploring new businesses and technologies isn't the only reason to have one foot in the venture capital stream, said Jeffrey Nadison, Regional Director, Business Development at John Deere's European Headquarters in Mannheim, Germany. As in all business activities, information flows to those who network, and Deere's exposure to information goes beyond a single venture capital fund. Deere is a member of CleanTech Network, LLC, a consortium of investors, funds, and professional firms interested in clean technology.

CleanTech, which says it founded the clean technology investment category, distinguishes between envirotech, or greentech, and cleantech categories. It says the other categories are more focused on ventures and technology that will help meet regulatory requirements, with high returns a secondary goal. Cleantech, by contrast, is populated by businesses focusing on new technology with the potential for high returns, but that also happen to be able to mitigate global environmental, health, or other challenges.

The growth machine

Growth can't be left to chance, points out Mike Mack, Deere & Company Senior Vice President and Chief Financial Officer. Growth requires a strategy and a rigorous process.

John Deere's strategy is 30/70 innovative growth, an initiative that stipulates that 30 percent of the company's growth will come from products, services, and markets new to the company.

To execute that strategy, the company created a structure and an organization at the enterprise level that operates alongside the divisional business development groups. The basic structure is the seven-phase Business Growth Process announced in the fall of 2006. The process is designed to generate and capture growth ideas, vet them for commercial viability and strategic fit, and track not only growth, but the performance of the growth process itself.

To meet the 30/70 innovative growth requirement, ideas that enter the process have to include a significant number of opportunities based on innovation-based products, services, and markets new to the company.

That's the focus of the accelerated innovation process. AIP is designed to speed up and improve the quality of innovation throughout the company.

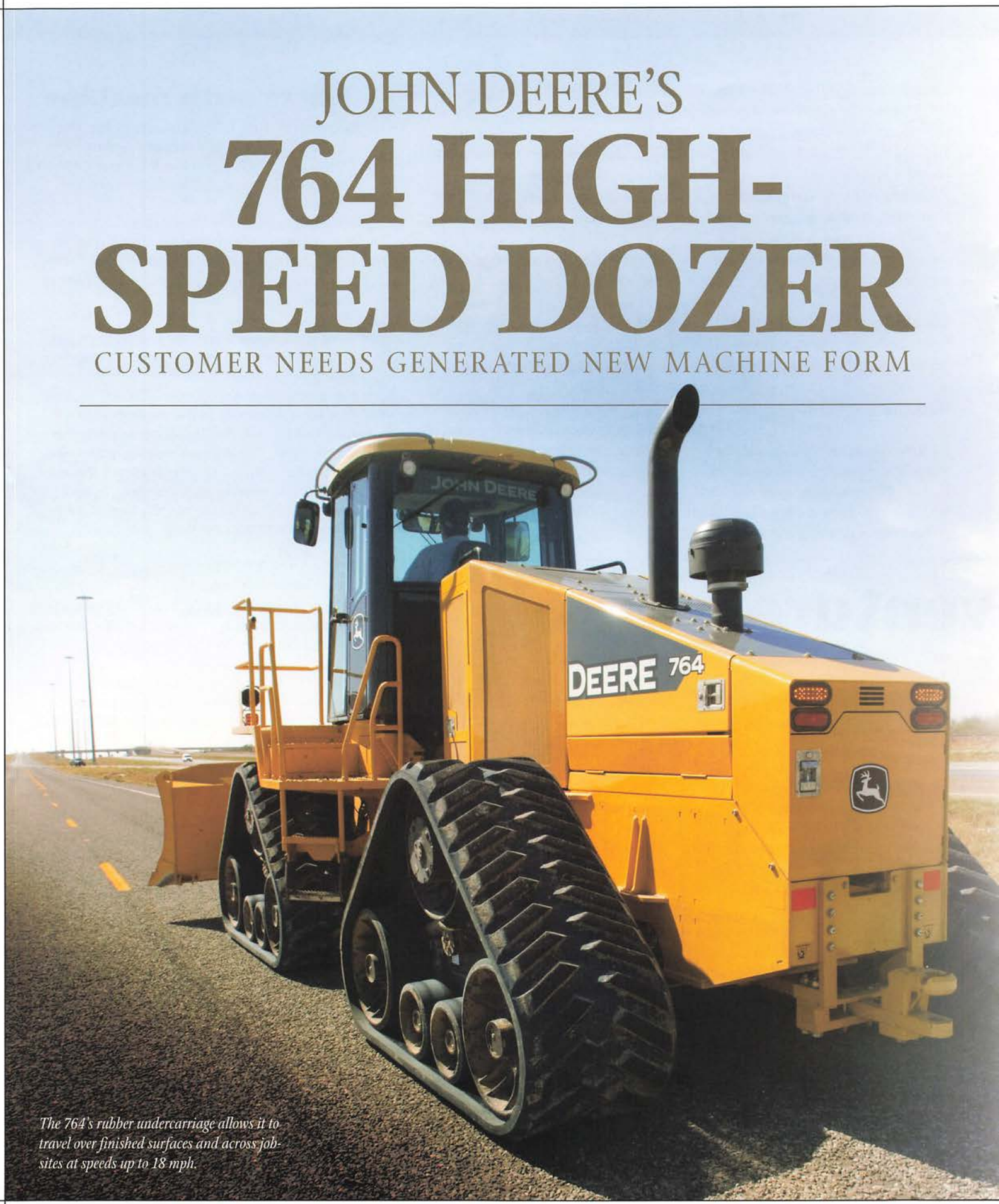
The AIP is implemented through two groups, the Enterprise Advanced Marketing Group and the Product Technology and Innovation Group. These groups, operating with the Corporate Business Development Group, track market trends and customer needs, and product trends and technology advances.

Support and oversight for the AIP comes from the Global Technology Advisory Council, a group of academics and industry leaders, and, within Deere, from the Innovation Growth Council.

The entire structure, along with the business development functions at the division and regional levels, ensures that the search for growth is customer focused and the risks well managed.

JOHN DEERE'S 764 HIGH-SPEED DOZER

CUSTOMER NEEDS GENERATED NEW MACHINE FORM



The 764's rubber undercarriage allows it to travel over finished surfaces and across job-sites at speeds up to 18 mph.

The John Deere 764 High-Speed Dozer might turn a few heads in the construction industry. "The machine form itself is new," said Scott Bayless, Product Consultant — High-Speed Dozer. "Nobody else has ever made an articulated rubber-track dozer."

The industry-first machine provides a smoother ride than a tracked vehicle with a solid frame, and the rubber tracks allow it to travel throughout a jobsite, even across finished pavement, without damaging the ground. According to Bayless, the front-end suspension provides a comfortable ride at speeds of up to 18 miles per hour, three times the typical top speed of traditional steel-track crawler dozers.

During transport isn't the only time this dozer can move faster than similar machines. "The platform is so stable that level grading can be done at speeds up to 6 miles per hour," said Bayless. He said traditional machines usually grade at speeds up to 3 miles per hour.

The 764 HSD was designed specifically to meet several identified customer needs. "Customers are looking for higher productivity when doing finish grading work, higher mobility, and they always want to improve operator comfort," said Bayless. "All of this could not be accomplished by any single machine form out there."

Rubber tracks and articulated steering on the 764 HSD minimize ground disturbance, reducing the number of finish passes. The 764's rubber tracks are also less likely to cause punctures while installing liners.

For reduced vibration and increased operator comfort, hydraulic cylinders in the suspended mainframe function as ride-enhancing shock absorbers. The machine's low-mounted drivetrain components contribute to a low center of gravity and exceptional side-hill stability. The cab-forward design provides one-of-a-kind blade visibility, and isolates the operator from the powertrain for a quieter work environment.

This new concept in earthmoving equipment combines the flotation of a crawler, agility of a loader, and finish-grading ability of a motor grader.

RESULTS AND A NEW KEEP CI

While John Deere factories are turning out high-quality machines, the factories and the processes in them are constantly being improved, too, thanks to CI teams.

CI is shorthand for Continuous Improvement, a process by which teams of employees in Deere production operations set quarterly improvement goals for safety, quality, delivery, and efficiency and complete projects to accomplish them.

Now included as part of the Deere production and product quality systems, CI was begun in 1999 as a joint project of John Deere and the United Auto Workers, which represents production employees at many of the company's midwestern United States plants.

"Our argument has always been, 'let us help; let us participate in setting up the workplace and running it,'" said Jim Hecker, who, as Deere coordinator for the United Auto Workers International, came up with the CI Process idea. He and Ken Huhn, Vice President, Industrial Relations, led a joint UAW-Deere team that designed the process.

CI fits Deere's culture, notes Huhn. "Based on the Deere culture, our primary mission, stated very simply, is to make employees successful. We see CI as one of the important tools to accomplish that," he said, "and we're pretty proud that we were able to develop a tool in our UAW units that is seen as a best practice and is now deployed in all units."

The CI team in Dept. 647 at Waterloo Tractor and Cab Operations: From left, back row, Kurt Schmitz, Dan Brimm, Dan Power, Matt Meyers, Derek Mc Broom, Chad Simms; front row, Kevin R. Smith, Ron Hutschenreuter, Toby Mc Clellan, Darnell Nicholas, Michael Walker, Bob Byersdorfer, and James Komen.

CI has not only grown to become part of operations at John Deere factories around the world, but also has matured as a process. "It has gone from guys saying 'I need a fan' or 'I need a light' to teams analyzing the data provided to create projects," said Waterloo Works CI Coordinator Kevin Smith. "Using both shop floor opinion and data is an evolution." He said CI teams rely on data gathered throughout the factory, from safety, engineering, and quality, for example, and use it to conduct gap analyses in each of the four CI areas.

"It's data driven, that's the key," agreed Mike Lacher, the UAW CI Process Coordinator. The CI teams compare the measures of current activity with their goals, using tools such as critical-to-quality flowdown and root-cause analysis. "They use data to look for the biggest gaps," Lacher said. Each team has to create "gap projects," things they can do to close the gaps between current operations and their goals.

Projects are not necessarily big, but the effects are. In fiscal year 2007, CI teams at 45 John Deere factories completed more than 20,000 projects. That's about one project for each team member, notes Brad Morris, Deere & Company Continuous Improvement Process Coordinator.

It's not the number of projects that counts, though, it's the results. CI projects are one reason John Deere factories are uncommonly safe workplaces. CI affects productivity, too, the output per unit of input. Increasing productivity is critical to the growth of a company, but it can be tough to come by, especially if workers are already efficient. Productivity is typically increased by adding capital — new machine tools, for example — or improving technology. John Deere makes such capital and technology investments regularly, keeping factories up to date and increasing efficiency. Even so, over the past four years productivity has increased 15.6 percent above what can be attributed to capital and technology investments alone, Morris said. "How do we get that? Through 20,000 CI projects," he said.

Top CI teams rely heavily on data, and thus have a big impact on operations. Coordinators say one of the top teams in the company is Dept. 647 at John Deere Waterloo Tractor and Cab Operations, which does

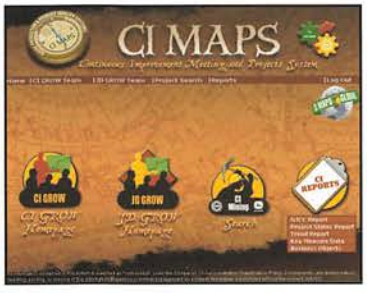
TOOL EXPANDING

final assembly on 8000 Series Tractors. In fiscal year 2007, the team completed 107 projects. Some of the metrics: A 40-percent reduction in safety incidents; a 23 percent improvement in product first-pass yield; a 14-percent improvement in linearity.

Projects ranged from installing alerts to warn assemblers when big wheel assemblies are being lowered onto the line, to getting testing software reprogrammed to perform simultaneous calibrations, reducing cycle time.

CI teams don't just solve problems, they prevent them, too. In one project last year, the Dept. 647 team noted the possibility of installing the wrong wiring harness as tractor chassis moved down the line. The team created a bar coding and software system that ensures each tractor configuration gets the right harness.

Homegrown tool helps CI teams



The CI MAPS application has made it easier for CI teams to keep on track and concentrate on the most important improvements.

CI MAPS is helping to spread the process through the enterprise and standardize it.

The move to more rigorous analysis and data-based decisions has been paralleled by the development of an online tool called CI MAPS (Continuous Improvement Meeting and Projects System). Designed in-house under IT project manager Sue Lobb, the system is a virtual project office, where projects are launched, tracked, documented, and, once completed, shared across the enterprise. It has done away with cumbersome paperwork and the various databases and systems individual units built to administer CI. As important, CI MAPS ensures that CI teams and CI leadership hold regular meetings, a difficult thing to do in production environments.

"There are 650–700 production teams around the world," Lobb said. When CI MAPS is installed everywhere, "all of them will have a common tool for continuous problem solving."

"In MAPS, every unit has its own site," Lobb said. Unit employees can look at metrics, goals, and other documentation only on their own site. Sharing finished projects, an important part of CI, is easy, though. Anyone can view finished projects from any other site.

CI is serious work

Continuous Improvement, a structured system for constantly improving work and processes in John Deere factories, is a competitive advantage for the company and its employees because it utilizes employees' ideas for improving operations. "It's driven from the bottom up," said Pat Dunlay, Unit Chairman, UAW Local 838 at Waterloo Tractor and Cab Operations. "It does work. People on the shop floor really get involved. The ideas have always been there," he said, "but the mechanism to get them accomplished wasn't always there."

"For us to be competitive, all employees have to have a voice," said John Kane, Operations Manager. "I believe CI is the most important initiative for that, a systematic way for every employee to have their voice heard in a positive way, and taking the company's goals to the shop floor.

Partly because of CI, he said, "Safety is good, quality is at an all-time high, and warranty is the best it's been. We've had a large increase in linearity, and we've grown the business. I don't think we've ever seen it this good."

One example of CI's power: Waterloo Tractor and Cab Operations is a supplier to John Deere's Augusta factory. "We weren't doing as well as we should delivering cabs to Augusta," Kane said. "The more my staff and I worked with them, the worse it got. Finally, we had the CI teams (at Waterloo and Augusta) work it out. We went from Conditional Supplier (a low rating under the AE supplier measurement system) to Key Supplier in one year."

Employees key to cutting energy use

John Deere's greenhouse gas reduction goal, announced in June, will require all employees to be more environmentally conscious. John Deere's greenhouse gas, or GHG, emissions are mostly related to energy use, so reducing them means reducing energy use. John Deere has been formally tracking and reducing energy consumption since 1973, so meeting the new goal will not be easy.

Members of the company's Energy Steering Committee say reducing electricity and natural gas consumption further will depend a lot on employees finding ways to cut total energy use. "What we want to do is take it to the employee level," said Stephen Dickson, Construction & Forestry Division Engineer and a member of the Energy Steering Committee. Construction & Forestry Division's Davenport and Dubuque Works have already begun awarding prizes to employees who submit energy-saving ideas.

To reduce energy further, environmental and facilities engineers are taking another look at their operations. Some are arranging energy audits by utilities or energy audit specialty firms.

"We are in the process of conducting an energy audit," said Deb Shaw, John Deere Des Moines Works engineer and a member of the Energy Steering Committee. One thing an audit can do is help engineers decide if sub-metering is necessary, and, if so, where. Adding meters to measure use in defined areas might help identify places to concentrate reduction efforts, Shaw points out. She said it could also help identify shifting energy use within the facility that doesn't show up in overall totals.

Some things that will help are obvious, but have to be turned into habits. Most units have begun or are planning employee communications to "let employees realize that they have a major impact," Shaw said. For example, if comfort fans at workstations are left plugged in at night, she said, "it begins to add up."

Adds Julia Vacquier, Environmental Professional Advanced, at John Deere Power Systems' Saran, France, site and a member of the Energy Committee, "We have a lot of work to do to change employee behaviors. It's more difficult to change behavior, but it is good for the long term," she said.

Like other factories, Vacquier said, Saran is working to get more detail on its electricity consumption, starting with its compressed air system, an area everyone is looking at.

Sometimes called the "fourth utility" after electricity, gas, and water services, compressing air is energy-intensive. Just fixing all the small air leaks in a system can increase capacity by as much as 25 percent and dramatically cut the amount of electricity needed to run the compressors.

The long-term answer, though, remains employee engagement, and not just in factory operations. Saran is launching a Web site through which employees can share rides, cutting down the GHG emissions from vehicles. C&F has a similar site for travel between its plants in Davenport and Dubuque, Iowa. Employees are also often the best source of energy-saving ideas. "We've had 150 suggestions submitted so far," said Dickson, at C&F, which also held training sessions on energy reduction for employees. "We've created a very good framework, and now we are chasing projects."

Deere sets GHG reduction goal

In conjunction with its participation in the U.S. Environmental Protection Agency's Climate Leaders program, Deere & Company has committed to reducing its total global emission of greenhouse gases, or GHG, by 25 percent per dollar of revenue from 2005 to 2014.

Climate Leaders, which Deere joined in 2007, is a voluntary industry-government partnership that works with companies to develop long-term comprehensive climate-change strategies. Participants set a corporate-wide GHG reduction goal and annually report their progress to the EPA.

The company's GHG emissions are a mix of direct and indirect emissions. Direct emissions come from such operations as foundry, heat treat, painting, powerhouse, and testing. Indirect emissions come from John Deere operations' demand for electricity. To measure indirect emissions under the GHG program, Deere units track their electricity and steam purchases and from that calculate the GHG emissions released by the utility that supplies the electricity and steam.

Replacing lighting at Harvester Works reduced energy use. Such projects can help meet greenhouse gas reduction goals.

ORIGINS

John Deere's education and training systems help employees gain the skills and knowledge they need to reach their goals. John Deere Learning, an online learning tool built around the concept of learning colleges, provides access to a range of courses and is one popular development tool among salaried employees in the United States and Canada. Plans are underway to make it available to employees globally.

Some John Deere Learning numbers:

- Number of courses offered: 3,827
- Number of online courses: 767
- Classes held in 2007: 8,504
- Total employee courses completed in 2007: 158,850
- Number of employees who attended at least one class or completed an online course in 2007: approximately 26,360.

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